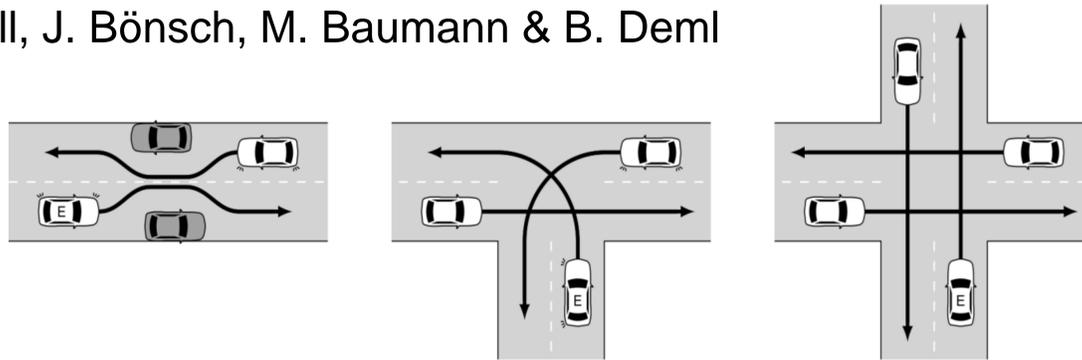


Expectations of automatic vehicle guidance in cooperative situations: modelling with Naturalistic Decision Making

J. Imbsweiler, T. Stoll, J. Bönsch, M. Baumann & B. Deml



Objective

With the introduction of automatic vehicle guidance (AV) mixed traffic scenarios between automatically and manually guided vehicles are to be expected, at least at the beginning. Thereby, situations which afford a cooperative interaction between human drivers and AV are of particular interest.

An approach to understand human decisions in cooperative situations is the Natural Decision Making (NDM). It describes how experts decide in complex and uncertain conditions. An example for the NDM is the "Recognition Primed Decision Model" (RPD) of Klein (2008) which we applied for this study. With the help of a "Recognition Module" it divides the decision into "Actions", "Expectancies", "Relevant Cues" and "Goals". **Our objective is to model cooperative processes in the field of traffic interaction.**

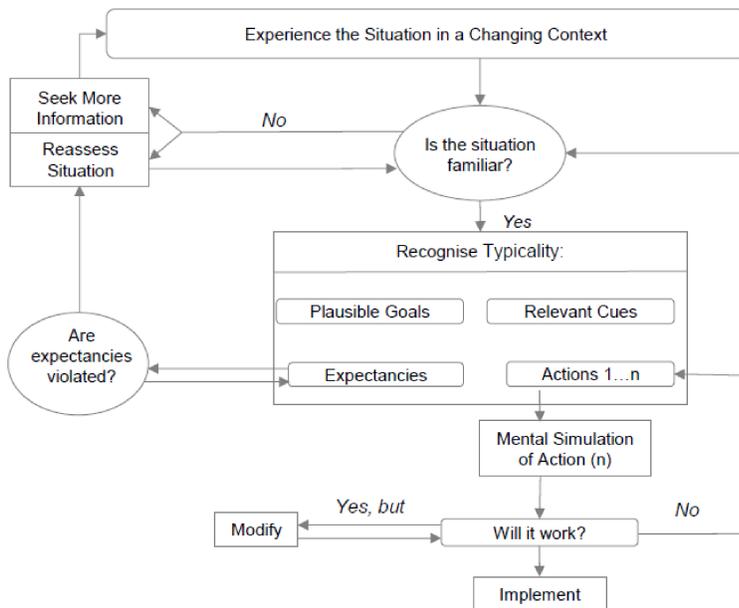


Figure 1. Recognition-primed decision model by Klein (2008)

Method

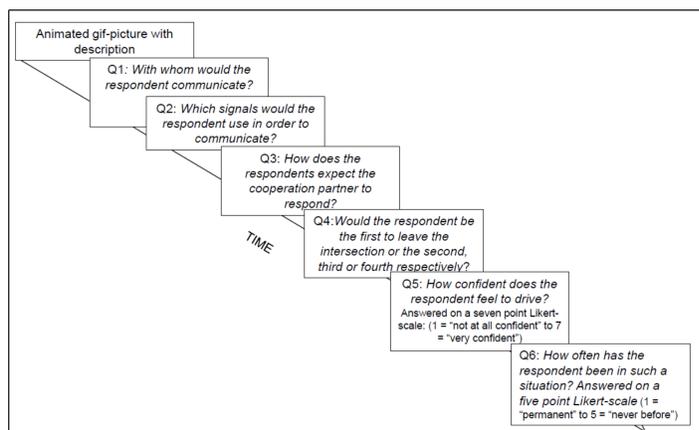


Figure 2. Procedure of the survey. See Imbsweiler et al. (2018)

An online-survey on six different cooperative und interactive city-scenarios was carried out. Respondents (complete N = 89) were asked how they would behave in a cooperative scenario with an AV and what they would expect from the AV (see the figures in the poster headline).

Results

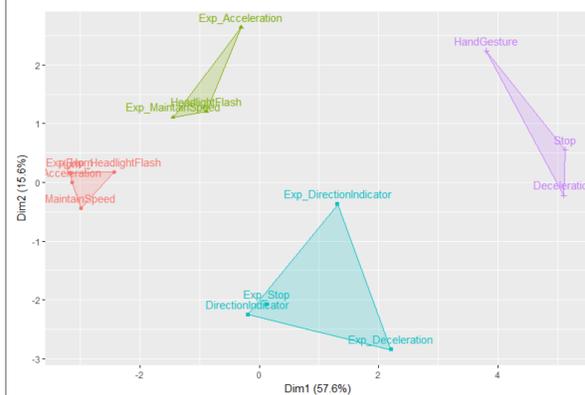


Figure 3. Fuzzy-Clustering of the goals and expectancies with four clusters as preparation for the logistic regression. Exp = Expectancies.

	95% CI for odds ratio			
	B (SE)	Lower	Odds Ratio	Upper
2:(intercept)	1.804** (0.918)	0.006	6.076	3.603
Cluster1	-1.107*** (0.280)	-1656	0.331	-0.558
Cluster2	1.091*** (0.338)	0.428	2.976	1.753
Cluster3	-0.629*** (0.147)	-0.917	0.533	-0.342
Cluster4	0.633*** (0.168)	0.303	1.883	0.963

Note: McFadden-Pseudo² = .228; Observations 430; Log Likelihood -148.65; Akaike Inf. Crit. 1,307.305, ***p < .01, **p < .05

Table 1. Logistic regression with the clusters of the Fuzzy-Analysis as predictors and the goal as criterion. Driven first = 0 and driven second = 1.

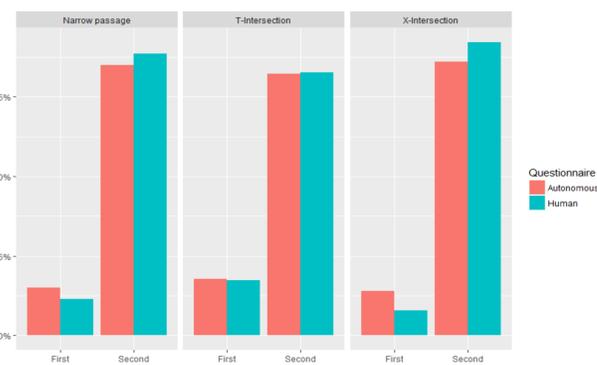


Figure 4. Comparison between the actual study with the dataset of Imbsweiler et al. (2018) regarding the goals.

Conclusion

It can be summarized that the expected and the own actions can be allocated to clusters. Furthermore, these clusters can predict the driving sequence.

It is also noticeable that there is no difference whether the cooperation partner is an AV system or a human cooperation partner.

The NDM approach according to Klein (2008) appears suitable for modelling cooperative processes.